

New Standard for Use in Ultimate Analysis of Organic Compounds Especially Suited for Microprocedures

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FOR the past three years *S*-benzylthiuronium chloride (benzyl-isothioureia hydrochloride, listed by Eastman Kodak Company in Catalog 34 of Organic Chemicals) has been used in this laboratory as a standard material in the ultimate analysis of organic compounds. It more nearly fulfills the criteria established by Hillebrand (2) for judging the fitness of material used as a standard to check on analytical procedures than most of the standards in common use.

Since *S*-benzylthiuronium chloride contains the five elements most commonly encountered in organic analysis—namely, carbon, hydrogen, nitrogen, chlorine, and sulfur—and since it also contains a benzene ring, a thio ether linkage, amine and imine groups, and an ionizable chlorine atom, it is suitable for checking the methods of analysis of any or all of the five elements in a wide variety of compounds. Its use as a standard for carbon and hydrogen not only serves to prove that combustion is complete but also shows the effectiveness of the removal of the acid-forming gases of the three elements most likely to interfere with this determination.

The synthesis and recrystallization of the pure compound (1) require no unusual apparatus or techniques and its purity is readily established by confirming analyses for any two or more of the five elements. After drying at 110° C., no precautions are required for its storage, since under ordinary conditions it is stable and nonhygroscopic.

Table I. Analysis of *S*-Benzylthiuronium Chloride

Element	Methods	Percentage Composition	
		Found (Range)	Theory
Carbon	Dry combustion	47.22–47.55	47.40
Hydrogen	Dry combustion	5.36–5.53	5.47
Sulfur	Catalytic combustion and peroxide bomb	15.71–15.89	15.82
Chlorine	Catalytic combustion	17.41–17.59	17.49
Nitrogen	Dumas and Kjeldahl	13.68–13.88	13.82

The standard has been analyzed repeatedly for the different elements by the following procedures: dry combustion carbon and hydrogen, catalytic combustion and peroxide bomb sulfur, catalytic combustion chlorine, and Dumas and Kjeldahl nitrogen. Representative analytical data obtained on the compound are shown in Table I.

LITERATURE CITED

- (1) Donleavy, J. J., *J. Am. Chem. Soc.*, **58**, 1004 (1936).
- (2) Hillebrand, W. F., *J. IND. ENG. CHEM.*, **8**, 466 (1916).